

**Getting from here to there and
back – The impact of a few
transportation innovations on history**

Class 2

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What We Will Cover Today

- Finish the discussion on horses
 - Significant wars involving the horse and some of the historical consequences of those wars
 - What if the horse had never been domesticated or had become extinct
 - The horse and the origin of motion pictures
- The impact of the camel
- The Impact of the sailing ship
 - The full-rigged ship
 - Cannon

Unification of China

- Qin conquest of China
 - Steppe nomads using chariots created the Qin empire of China
 - Ended the “Warring States” period
 - Created a unified China for the first time
 - Paved the way for the Han Dynasty

The Second Punic War

- Hannibal made use of cavalry to defeat Roman infantry in several major battles
 - Cannae was the most famous because of the tactics Hannibal used
- The Roman defeat of Hannibal's army at Zama was made possible by Numidian cavalry (now allied with Rome)

The Fall of Rome

- The Fall of the Western Roman Empire was hastened by the migration from northeast Asia of the Huns
 - The Huns displaced other tribes in a cascading pattern
 - Arriving in Europe, the Huns attacked the Goths who fled into the Roman Empire
 - Eventually, the Huns crossed the Rhine and later invaded Italy

The Avars

- In the 6th century, the Avars invaded Europe
 - They introduced the stirrup and a saddle with a reinforced back into Europe
 - These innovations allowed a rider to anchor himself to the horse with his feet, freeing his hands to both carry a shield and sword or lance.
 - The stirrup eventually led to the Medieval knight

The Arab Conquests

- In 224, Parthian rule in Persia was replaced by Sasanian rule.
 - Led to a long series of wars between Rome-Byzantium and Persia
- After a long, mutually exhausting war, Arab invaders in 636 defeated the Byzantines and conquered Persia with the aid of the Arabian horse and the Arabian camel

The Battle of Tours

- At Tours in 732, Frankish infantry defeated Arab cavalry
- As a result of the battle, Martel decided that he needed a significant cavalry force
- This led to the development of feudalism as a means of supporting and equipping a professional cavalry force

The Carolingians & Feudalism

- The development of feudalism made possible the supporting and equipping of a professional cavalry force
- With mounted cavalry, Charlemagne was able to create the Carolingian empire
- Later, with the destrier and chain mail/body armor, the armored knight came into his own

Medieval Knight



Impact of the Horse Collar

- Another invention that revolutionized Medieval Europe was the horse collar and breast strap
- The horse collar enabled Europeans to replace oxen with horses
 - Peasants now could plow land much faster with much less effort and time
 - Merchants, traders, and peasants could also use the horse to pull 4-wheel wagons with heavy loads

The Mongol Empire - 1

- The Mongol armies consisted of light and heavy cavalry
 - The light cavalry was equipped with bows-and-arrows, sword or battle axe, javelins, and a leather-covered wicker shield
 - The heavy cavalry wore iron helmets, leather body armor with rings or scales of iron and carried a shield, bows-and-arrows, scimitar, and lance
 - During battle, a screen of light cavalry unleashed a volley of arrows, moving to the rear to allow the heavy cavalry to advance in a massed charge

The Mongol Empire - 2

- The Mongols conquered Russia, sacked Baghdad, conquered China, and reached as far as Breslau and Budapest in Europe
 - The peace and order introduced by the Mongols fostered trade along the Silk Road
- The Mongols introduced several Chinese technological innovations to Europe
 - Paper currency
 - Block printing technology
 - Gunpowder
 - Cast iron/steel

The Mongol Empire - 3

- Two unintended consequences of the Mongol conquests eventually undid the Mongol Empire
 - Mongol horsemen brought back the bubonic plague from Burma and Yunan
 - The gunpowder which the Mongols brought to Europe led to the development of firearms which could overwhelm Mongol archers

Firearms and the Horse

- The invention of firearms made the knight obsolete since bullets could penetrate the knight's armor
- Despite the coming of firearms, warrior elites on horseback resisted acceptance of the longbow and gun since it threatened their elite status
 - Thus cavalry charges persisted into the wars of the 19th century and even into World War I

Firearms and the Horse - 2

- Despite elite warrior resistance, the horse's role by the 19th century became that of:
 - Scouting,
 - Screening infantry movements,
 - Raiding enemy supply lines,
 - Transporting supplies and soldiers to the battlefield
 - Transport of artillery pieces,
 - Removing wounded from the battlefield
 - Foraging
- Battles of cavalry units, such as the Civil War battle of Brandy Station, were between men on horseback armed with rifles and pistols.

Firearms and the Horse - 3

- Paradoxically, the large conscript armies of the 20th century required large numbers of horses to meet the massive logistical demands
- In World War I, every army depended on horses to move supplies from railheads to the front
 - In World War II, the German and the Russian armies both relied on horses for their logistics

Firearms and the Horse - 4

- In the 21st century, the horse still has had a role in war
 - In the Sudan, the Arab Janjaweed fighters use horses in their wars in Darfur, western Sudan, and Eastern Chad
 - In Afghanistan, U.S. Special Operations Command (SOCOM) used horses in the northern mountains of Afghanistan

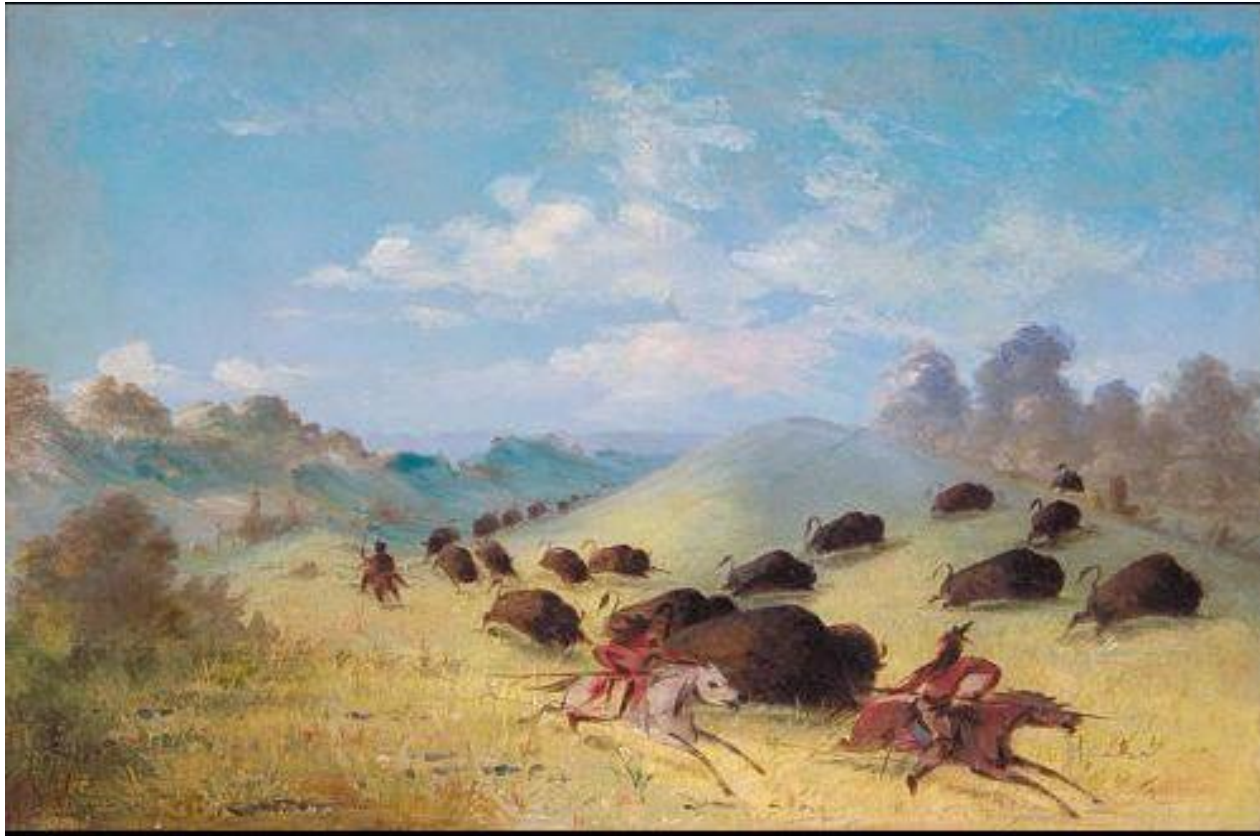
The Horse Cultures of the Plains Indians - 1

- The horse played a major role in the Spanish conquest of the Aztec and Inca empires
- By the early 1600s, Spanish rule and horses had spread to the Pueblo settlements of the American Southwest.
- In 1680, the Pueblos revolted
 - Led to the escape of thousands of Spanish horses

The Horse Cultures of the Plains Indians - 2

- Before the horse, the North American prairie had few human inhabitants
 - The tough sod without a steel plow discouraged farming
 - Buffalo were too fast to easily hunt
- The horse's speed enabled hunters to single out a specific animal and kill it at close range with a bow-and-arrow
 - The Comanches of Texas were the first to use the horse to hunt buffalo.

Comanche Indians Hunting Buffalo



The Horse Cultures of the Plains Indians - 3

- The horse impacted the Amerindians in ways other than that of hunting buffalo
 - Made travel across the Plains easier
 - Led many tribes to relocate to the Great Plains
 - As buffalo-hunting tribes increased in number and size, intertribal wars became common
 - In the Southwest, the Comanche won out over their Apache rivals, forcing them westward where they become the Navaho

The Horse Cultures of the Plains Indians - 4

- The horse and the warrior culture that it engendered enabled the Plains Indians to resist Euro-American settlement
- The result was a series of Indian wars that lasted through much of the 19th century
 - These wars ended only when the Amerindian food base – the buffalo – was destroyed

If the Horse Had Never Been Domesticated

- The impact of the horse can be illustrated by comparing the Old World which had the horse to the New World which didn't
 - With the horse, the Old World saw the emergence of the nomad horse cultures of the steppes.
 - Without the horse, the prairies remained undeveloped and largely uninhabited.

If the Horse Had Never Been Domesticated - 2

- Horses promoted trade in commodities and products that could not be easily carried by human porters
 - Persian, Chinese, and Roman rulers embarked on road construction. There was no such construction in the Americas
 - The Silk Road, especially under the Mongols, promoted extensive trade across Eurasia, There was no equivalent Silk Road in the Americas
- Without horses, ideas and inventions would have spread much more slowly or not at all

If the Horse Had Never Been Domesticated - 3

- In the Old World:
 - Trade and idea dissemination promoted the growth of metallurgy.
 - The horse permitted the creation of empires.
- In the New World:
 - Metallurgical advances around the Great Lakes did not reach the Aztec or Inca domains
 - Empires were limited by logistic inadequacies
- Aztec-Incan armies were technologically inferior to their Spanish enemies

If the Horse Had Never Been Domesticated - 4

- Without the horse:
 - Old World civilizations would have remained isolated in their alluvial valleys
 - The Central Asian steppe would have remain undeveloped and largely uninhabited
 - The empires of Persia, Alexander, Rome, and Genghis Khan would never have been created
 - The great inventions of steel, paper, printing, gunpowder, and the zero might well have never been diffused across Eurasia

Muybridge Horse Photographs



Impact of the Camel

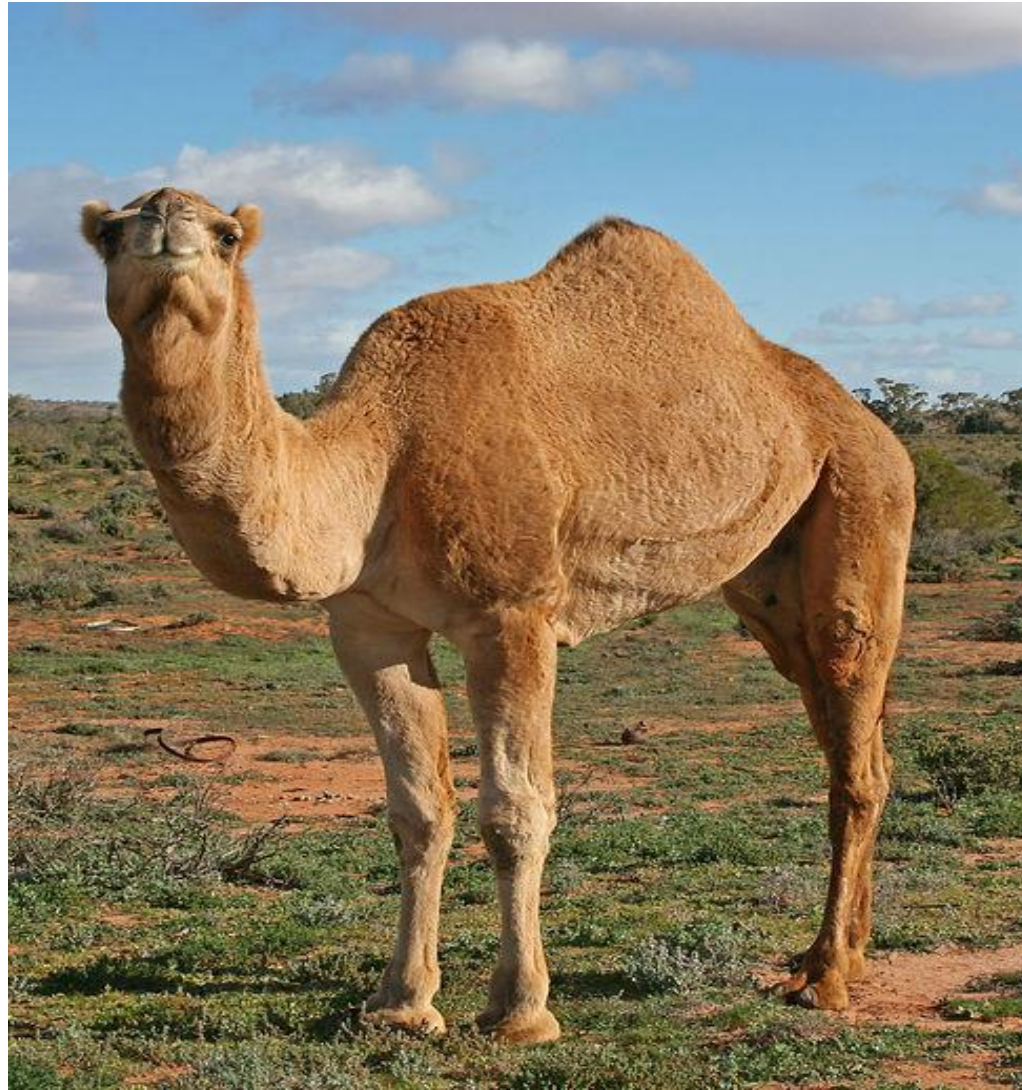
Notes About the Camel - 1

- There are two types of camels
 - The Arabian camel or dromedary which has one hump
 - It inhabits the Sahara and Arabian deserts, the Middle East, North Africa, and Australia
 - The Bactrian camel which has two humps
 - It inhabits the Gobi and Taklamakan deserts, Central Asia, and Mongolia

Bactrian Camel



Arabian Camel



Notes About the Camel - 2

- Camels do not store water in their humps, but distribute it uniformly throughout their bodies
- Camels can go days, even a few weeks in exceptional circumstances, without water
- The Bactrian and Arabian camel can interbreed
- The Arabs used the dromedary, but both types of camels were used on the Silk Road as carriers of trade goods

Notes About the Camel - 3

- A camel can carry up to 900 lbs for short distances.
 - It was also used for riding, tilling the land, pulling carts, and as a source of meat and milk
- When crossing a hot desert, a camel carried between 120-200 kilograms (55-90 lbs) of cargo for 8-12 hours a day at 2.5 to 5.0 miles an hour (in addition to the water it needed for drinking)

Notes About the Camel - 4

- The Arabian camel was first domesticated in Arabia
- Camels were not widely used in combat
- Camels were indispensable in the desert for the logistical capability they provided
 - Used to carry the water and forage needed by the horses
- With camels, Arab armies could traverse the desert to make surprise attacks on enemy garrisons and troop concentrations

Arab Conquests - 1

- In 224, Parthian rule in Persia was replaced by Sasanian rule.
 - This touched off a long series of wars between Rome-Byzantium and Persia
- With both Byzantium and Persia exhausted,
 - Arab invaders in 636 defeated the Byzantines and conquered Persia
 - Key to this was the Arabian horse and the dromedary camel
 - Arab invaders were aided by large sections of the Syrian and Egyptian populations

Arab Conquests - 2

- From the Middle East, the Arabs advanced eastward into Persia and Central Asia and westward into Egypt, North Africa, and Spain
 - Arab conquest of North Africa (present day Libya, Tunisia, and Algeria) was aided by Berber resentment of Roman-Visigoth rule
- In 711, an Arab-Berber army led by Tariq ibn Ziyad landed near Gibraltar and by 720 conquered all of Spain except for the Asturias

Arab Conquests - 3

- At Tours in 732, Frankish infantry defeated Arab cavalry
 - One reason the Franks won was that they placed their army on a wooded hill, forcing the Arabs to charge into a wooded area
 - As a result of the battle, Martel decided that he needed a significant cavalry force
- This led to the development of feudalism as a means of supporting and equipping a professional cavalry force

Effects of the Camel - 1

- With the camel saddle, the camel replaced wheeled transport in large parts of the Middle East and North Africa
- Because they could cross inhospitable deserts, camels brought Tibet, central Asia, the Arabian peninsula, and sub-Saharan West Africa into the world trading economy
 - Led to a massive camel caravan trade between North Africa (including the port of Ceuta), Mali (where rock salt was mined) and Timbuktu

Effects of the Camel - 2

- In 1324-25, Musa I (aka Mansa Musa), ruler of the Mali Empire, went on a pilgrimage to Mecca
 - He brought with him 80 camels (each carrying anywhere from 50-300 lbs of gold) and spent very freely en route
 - One of the places he visited en route was Ceuta
- In 1415, Ceuta was captured by the Portuguese
 - After capturing Ceuta, the Portuguese heard about Musa's famous pilgrimage and decided they needed to find the mines that produced all this gold
 - Blocked by Islamic control of the desert route, the Portuguese decided to go via sea down the west coast of Africa

Effects of the Camel - 3

- The logistical capabilities of the camel led
 - The importation of camels into Australia and later the subsequent creation of a large population of feral camels
 - The creation of the U.S. Army Camel Corps which existed from 1857 to 1865
 - The creation of camel units by the British, French, German, Spanish, and Italian colonial armies